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How to comply with MARPOL 73/78

A commentary on the IMO's pollution-prevention instrument and the implications for the shipping industry

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Abstract. *The current paper aims at clarifying the extensive MARPOL 73/78 – the IMO's first and only integrated and all-embracing convention targeting pollution from ships – and its effects on the shipping industry, in particular shipowners and their P&I insurers. This is an essential topic since nations are becoming increasingly aware of the tremendous damage that is caused by environmental pollution and, accordingly, port authorities are taking a hard line as regards the application and compliance with the regulations of MARPOL. The research paper is based on three main points. The first section is a general overview of the MARPOL 73/78 and its structure and functioning. The second section provides understanding of why compliance with MARPOL is vital not only for the environment but also for the shipowners and their liability insurers. The third and lengthiest section attempts to translate the wordy and complicated technical provisions of the Convention into a simplified account of what shipowners should comply with. The discussion therein does not follow neatly the regulations of the annexes but instead is grouped and organized around the main issues concerning the respective annex, while in the same time references to the specific provisions are provided everywhere should the reader needs to consult the exact provision or to get acquainted with further details.*

1. General

The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) is the main international marine convention designed by the International Maritime Organization (IMO) to prevent pollution from ships, which may occur as a result of both operational and accidental causes. The Convention, being a combined instrument of the original 1973 Convention and the modifying 1997 Protocol, entered into force on 2 October 1983. Throughout the years, MARPOL has been regularly expanded and updated in order to take into account modern technical developments and environmental standards.

Currently, 153 states are a party to the Convention, representing 98.52% of the world shipping tonnage, which means that it has worldwide application.² All ships that fly the flag of a contracting party to MARPOL are subject to its regulations, regardless of where they sail. Contracting parties are responsible for the survey and inspections of the ships that operate

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² The data refers to Annex I and II of MARPOL 73/78 and is up to date by 27 April 2015. Source: the IMO.

under their authority as well for the issuance of the necessary on-board certificates, and for sanctioning any violation of MARPOL 73/78.

The Convention comprises six technical Annexes covering various aspects related to the prevention of marine pollution. Most Annexes designate special areas (*e.g.* the *Baltic Sea area*, the *Mediterranean Sea area*, the *Gulfs area*, the *Antarctic area*) where, for technical and ecological reasons and the particular character of their traffic, more stringent mandatory rules are adopted for the prevention of pollution.

Annex I of MARPOL 73/78 (date of entry: 2 October 1982) regulates the prevention of pollution by oil. It applies to every oil tanker of 150t GT and above and every other ship of 400t GT and above, and it sets forth rules for discharge of oil into the water. Annex I requires oil tankers to be provided with slop tank arrangements, an oil discharge monitoring system, and an oil-content meter. Also, it is mandatory for oil tankers to have double hulls as well as segregated ballast tanks or dedicated clean ballast tanks.

Annex II (date of entry: 2 October 1982) regulates the control of pollution by noxious liquid substances (NLS) in bulk. The Annex distinguishes between four categories of NLS. The discharge of NLS into the sea is prohibited and they should be discharged only to reception facilities when certain conditions, such as the concentration of the substance, are complied with; these conditions vary depending on the category of the substance.

Annex III (date of entry: 1 July 1992; 141 contracting parties; 97.79% of world tonnage³) regulates the prevention of pollution by harmful substances carried by sea in packaged form. It lays down general requirements and standards regarding packaging, marking and labelling, documentation, stowage, and quantity limitations.

Annex IV (date of entry: 27 September 2003; 134 contracting parties; 90.74% of the world tonnage⁴) regulates the prevention of pollution by sewage from ships. It forbids ships of 200t GT, or ships less than 200t GT which are certified to carry more than 10 persons, to discharge sewage into the water unless certain requirements are met (*e.g.* the presence of a sewage treatment plant; a system to comminute and disinfect sewage; or a holding tank).

Annex V (date of entry: 31 December 1988; 147 contracting parties; 98.03% of the world tonnage⁵) regulates the prevention of pollution by garbage from ships. It prohibits the discharge into the sea of all plastics, and sets rules for the discharge of different type of garbage depending on whether the ship is within or outside a special area.

Annex VI (date of entry: 19 May 2005; 80 contracting parties; 95.23% of the world tonnage⁶) regulates the prevention of air pollution from ships. It provides rules for the emissions of ozone-depleting substances, nitrogen oxides, and sulphur oxides as well as rules regarding shipboard incineration and fuel oil quality.

2. Consequences for the shipowner and for the P&I club in case of a violation of the MARPOL provisions

³ The data is up to date by 27 April 2015. Source: the IMO.

⁴ *Ibid.*

⁵ *Ibid.*

⁶ *Ibid.*

It is noteworthy that P&I Clubs usually cover liabilities, loss, damage, costs and expenses (e.g. cleaning-up expenses, costs of any measures to prevent or minimize pollution, liability for loss, damage or contamination) related to pollution risks in connection with the discharge or escape, or the threat thereof, of any substance from the insured vessel. There is also recovery with regard to costs or expenses, other than in the normal course of business, which stem from complying with any order or direction given by any authority (i.e. legislation giving effect to MARPOL) for the purpose of preventing or reducing pollution or the risk of pollution.

However, there will be no insurance cover for liability, loss, damage, costs or expenses incurred as a result of any discharge or escape in any land-based, dump, site, storage, or disposal facility. Furthermore, P&I Clubs normally make distinction between accidental pollution and that caused by an infringement of MARPOL. Accordingly, there is recovery for fines and penalties only in respect of accidental escape or discharge from the insured vessel, and there is no recovery for fines or penalties arising out of an infringement of the MARPOL regulations, which are outlined below.

When it comes to complying with MARPOL, shipowners must be aware of three main points that underlie the Convention – the sanctioning of violations, the issue of certificates, and the drafting of a report in case of an incident. Most importantly, any violation of MARPOL shall be sanctioned under the law of the state under whose authority the ship is operating, wherever the violation occurs. When any violation takes place within the jurisdiction of any Contracting Party, sanctions shall be established under the law of that Party (*Art.4, MARPOL 73*).

Secondly, a ship is required to hold a valid on-board certificate in accordance with the regulations. While in ports or offshore terminals of a Party, the ship can be inspected by authorized officers of that Party whether there is such a certificate on-board, and, if not, that Party may prevent the ship from sailing if it presents a threat of harm to the marine environment (*Art.5, MARPOL 73*).

Finally, the master of a vessel should timely make a comprehensive report to the department responsible for the issuance of the respective certificate, of any incident (e.g. an accident occurred to a ship, or a discovered defect that substantially affects the integrity of the ship or the efficiency or completeness of its equipment covered by MARPOL) involving harmful substances (*Art.8, MARPOL 73*). A report shall be made when there is: (a) a discharge of oil or of noxious liquid substances above the permitted level; (b) a discharge of harmful substances in packaged form; (c) damage, failure or breakdown of a ship of 15 metres in length or above (*Art.II, Protocol I, MARPOL 78*).

3. A comprehensive overview of the MARPOL Annexes

<i>Annex I of MARPOL 73/78 – Regulation for the Prevention of Pollution by Oil</i>

Surveys and inspections – every oil tanker of 150t GT and above, and every other ship of 400t GT and above, shall be subject to: (a) an initial survey before the ship is put to service or before the IOPPC is issued, covering her structure, equipment, systems, fittings, arrangements and material; (b) a renewal survey at intervals not exceeding five years; (c) an

intermediate survey within three months before or after the date of the first and second expiry of the Certificate, which shall take the place of one of the annual surveys; (d) an annual survey within three months before or after each expiry of the Certificate; (e) an additional survey either general or partial after a repair. The surveys shall ensure that the structure, equipment, systems, fittings, arrangements and material fully comply with this Annex (Reg.4).

International Oil Pollution Prevention Certificate (IOPPC) – it shall be issued after an initial or renewal survey to any oil tanker of 150t GT and above and any other ship of 400t GT and above (Reg.5). No IOPPC shall be issued to a ship entitled to fly a flag of a state which is not a party to the Convention (Reg.6). The duration of the IOPPC shall not exceed five years, and the period of validity ceases upon the transfer of the ship to the flag of another state (Reg.8).

Control of discharge of oil – any discharge into the sea of oil or oily mixtures from ships shall be prohibited except all of the following conditions are satisfied:

For oil tankers: (a) the tanker is not within a special area (*the Mediterranean Sea; the Baltic Sea; the Black Sea; the Red Sea; the Gulfs area; the Gulf of Aden; the Antarctic area; the North-West European waters*); (b) the tanker is more than 50 nautical miles from the nearest land; (c) the tanker is proceeding *en route*; (d) the instantaneous rate of discharge of oil does not exceed 30 litres per nautical mile; (e) the total quantity of oil discharged into the sea does not exceed 1/15,000 (for existing tankers) and 1/30,000 (for new tankers) of the total quantity of the particular cargo including residue; (f) the tanker has in operation (1) an oil discharge monitoring and control system, and (2) a slop tank arrangement.

Furthermore, oil tankers of 150t GT and above shall be provided with slop tank arrangements for cleaning the cargo tanks and for transferring the dirty ballast residue, tank washings, and oily waste from the cargo tanks into a slop tank or combination of slop tanks. The total capacity of slop tank/tanks shall be necessary to retain the slop generated by tank washings, oil residue and dirty ballast residue, and it shall not be less than 3% of the oil carrying capacity of the ship. New oil tankers of 70,000t DWT and above shall be provided with at least two slop tanks. Effective oil/water interface detectors shall be provided in slop tanks. Oil discharge monitoring and control system shall be fitted together with an oil content meter and a recording device to provide a continuous record of the discharge in liter per nautical mile and total quantity discharged, or the oil content and rate of discharge. The system shall come into operation when there is any discharge of effluent into the sea, and any failure of that system, or if the instantaneous rate of discharge exceeds the permitted limits under Reg.9, discharge shall stop automatically (Reg.15).

For ships of 400t GT and above, excluding discharge from cargo pump-room bilges and cargo mixed with oil residue: (a) the ship is not within a special area; (b) the ship is proceeding *en route*; (c) the oil content of the effluent without dilution does not exceed 15/1,000,000; (d) the ship has in operation (1) an oil discharge monitoring and control system, and (2) oil filtering equipment (Reg.9).

Any ship of 400t GT up to 10,000t GT shall be fitted with oil filtering equipment, which shall ensure that any oily mixture discharged into the sea after passing through the system has an oil content not exceeding 15/1,000,000.

Any ship of 10,000t GT and above shall be provided with oil filtering equipment and with arrangements for an alarm and for automatically stopping any discharge of oily mixture when the oil content in the effluent exceeds 15/1,000,000 (*Reg.16*).

Prevention of oil pollution from ships while operating in special areas – any discharge of oil or oily mixtures from any oil tanker and any ship of 400t GT and above (for the Antarctic area: any ship) shall be prohibited while in a special area. For ships of less than 400t GT, discharge is allowed when the oil content of the effluent without dilution does not exceed 15/1,000,000. Clean or segregated ballast is excluded from this regulation (*Reg.10*).

Exceptions – the regulations on discharge of oil (*Reg.9*) and on prevention of oil pollution in special areas (*Reg.10*) shall not apply when: (a) the discharge of oil/oily mixture is necessary for securing the safety of a ship or saving life at sea; or (b) the discharge results from damage to a ship or its equipment (provided that all precautions have been taken *post factum* for minimizing or preventing the discharge, and that there was no intent to cause damage or recklessness on behalf of the owner/master); or (c) the discharge into the sea of substances containing oil is for the purpose of combating specific pollution incidents in order to minimize the damage from pollution (*Reg.11*).

Segregated ballast tanks, dedicated clean ballast tanks, and crude oil washing (*Reg.13*)

New oil tankers⁷ – 20,000t DWT and above:

Every new crude oil tanker of 20,000t DWT and above (and more than 150m long) and every new product carrier (an oil tanker engaged in carrying refined oil products) of 30,000t DWT and above shall be provided with segregated ballast tanks. The capacity of these tanks shall have capacity allowing the ship to safely operate on ballast voyages without recourse to the use of cargo tanks for water ballast. Exceptionally, additional ballast water can be carried in cargo tanks, after cargo tanks have been crude oil washed, when: (1) the weather conditions are so severe that, in the opinion of the master, it is necessary to carry water in cargo tanks for the safety of the ship; (2) an exceptional case requires the tanker to carry ballast water in excess of the volume of the segregated ballast tanks. Every new crude oil tanker of 20,000t DWT and above shall also be fitted with a cargo tank cleaning system using crude oil washing.

The segregated ballast tanks which are located within the cargo tank length shall provide a measure of protection against oil outflow in the event of grounding or collision (*Reg.13E*). Every oil tanker of 5,000t DWT and above, for which the building contract is placed on or after 6 July 1993, shall have her entire cargo length protected by ballast tanks or spaces other than cargo and fuel oil tanks as follows: wing tanks or spaces, which shall extend either for the full depth of the ship's side or from the top of the double bottom to the uppermost deck; double bottom tanks or spaces (*Reg.13F*).

⁷ Building contract must be placed after 31 December 1976.

Existing oil tankers⁸ of 40,000t DWT and above:

Every existing crude oil tanker of 40,000t DWT and above shall be provided with segregated ballast tanks. The capacity of these tanks shall have capacity allowing the ship to safely operate on ballast voyages without recourse to the use of cargo tanks for water ballast. Exceptionally, additional ballast water can be carried in cargo tanks under the conditions that apply for new oil tankers of 20,000t DWT and above. However, existing crude oil tankers may operate with a cargo tank cleaning procedure using crude oil washing, in lieu of being provided with segregated ballast tanks.

Every existing product carrier of 40,000t DWT and above shall be provided with segregated ballast tanks. Their capacity shall have capacity allowing the ship to safely operate on ballast voyages without recourse to the use of cargo tanks for water ballast. Exceptionally, additional ballast water can be carried in cargo tanks under the conditions that apply for new oil tankers of 20,000t DWT and above. However, existing product carriers may operate, alternatively, with dedicated clean ballast tanks. An oil tanker operating with dedicated clean ballast tanks shall be equipped with an oil content meter.

Tanks for oil residues (sludge)

Every ship of 400t GT and above shall be provided with a tank or tanks to receive the oil residue (sludge) which cannot be dealt with otherwise, such as those resulting from the purification of fuel and lubricating oils and oil leakages in the machinery spaces (*Reg.17*).

Pumping, piping and discharge arrangements of oil tankers

In every oil tanker, a discharge manifold for connection to reception facilities for the discharge of dirty ballast water or oil contaminated water shall be located on the open deck on both sides of the ship. In every oil tanker, pipelines for discharge into the sea of ballast water or oil contaminated water from cargo tank areas shall be led to the open deck or to the ship's side above the waterline in the deepest ballast condition (*Reg.18*).

Oil record book

Every oil tanker of 150t GT and above shall be provided with an Oil Record Book Part I (Machinery Space Operations) and with an Oil Record Book Part II (Cargo/Ballast Operations). Every ship of 400t GT and above other than an oil tanker shall be provided with an Oil Record Book Part I. The Oil Record Book(s) shall be completed on the following occasions: **(a)** for machinery space operations (all ships): (1) ballasting or cleaning of oil fuel tanks; (2) discharge of dirty ballast or cleaning water from oil fuel tanks; (3) disposal of oily residues (sludge); (4) discharge overboard or disposal otherwise of bilge water which has accumulated in machinery spaces; **(b)** for cargo ballast operations (oil tankers): (1) loading of oil cargo; (2) internal transfer of oil cargo during voyage; (3) unloading of oil cargo; (4) ballasting of cargo tanks and dedicated clean ballast tanks; (5) cleaning of cargo tanks including crude oil washing; (6) discharge of ballast except from segregated ballast tanks; (7) discharge of water from slop tanks; (8) closing of all applicable valves or similar devices after slop tank discharge operations; (9) closing of valves necessary for isolation of dedicated clean ballast tanks from cargo and stripping lines after slop tank discharge operations; (10) disposal

⁸ These are all tankers that are not a new tanker within the meaning of *Regulation 13*.

of residues. In the event of an accidental or other exceptional discharge of oil not excepted by that regulation, a statement shall be made in the Oil Record Book (*Reg.20*).

<i>Annex II of MARPOL 73/78 – Regulation for the Control of Pollution by Noxious Liquid Substances (NLS) in Bulk</i>

Application – *Annex II* shall apply to all ships carrying noxious liquid substances (NLS) in bulk, including oil tankers as defined in *Annex I* when carrying a cargo or part of cargo of NLS in bulk (*Reg.1; Reg.2*). NLS are divided into four categories: **(a) Category A** – NLS which, if discharged into the sea, would present a major hazard to marine resources or human health, or cause serious harm to amenities or other legitimate uses of the sea and therefore require stringent anti-pollution measures. These are substances which are bioaccumulated and liable to produce a hazard to aquatic life or human health, or which are highly toxic to aquatic life; additionally, certain substances which are moderately toxic to aquatic life when particular weight is given to additional factors; **(b) Category B** – NLS which, if discharged into the sea, would present a hazard to marine resources or human health, or cause harm to amenities or other legitimate uses of the sea and therefore require special anti-pollution measures. These are substances which are bioaccumulated or which are liable to produce tainting of the sea food, or which are moderately toxic to aquatic life; additionally, certain substances which are slightly toxic to aquatic life when particular weight is given to additional factors; **(c) Category C** – NLS which, if discharged into the sea, would present a minor hazard to marine resources or human health, or cause minor harm to amenities or other legitimate uses of the sea and therefore require special operational conditions. These are substances which are slightly toxic to aquatic life; additionally, certain substances which are practically non-toxic to aquatic life when particular weight is given to additional factors; **(d) Category D** – NLS which, if discharged into the sea, would present a recognizable hazard to marine resources or human health, or cause minimal harm to amenities or other legitimate uses of the sea and therefore require some attention in operational conditions. These are substances which are practically non-toxic to aquatic life or which are causing deposits blanketing the sea floor with a high biochemical oxygen demand (*Reg.3; Appendix I*). The discharge of clean ballast or segregated ballast, as well as bilge or ballast water containing substances referred to in *Appendix III*, shall not be subject to the Annex (*Reg.4*). Special areas shall be: the *Baltic Sea area*, the *Black Sea area*, and the *Antarctic area* (*Reg.1*).

Discharge of NLS (*Reg.5*)

Category A, B and C outside special areas – the discharge into the sea of *Category A* substances (or ballast water, tank washings or other residues containing such substances) shall be prohibited. Upon washing tanks, containing such substances, the resulting residue shall be discharged to a reception facility until the concentration of the substance is at or below 0.1% by weight (for yellow or white phosphorus the residual concentration shall be 0.01%). Any water subsequently added to the tank may be discharged into the sea when all conditions are met: **(a)** the ship is proceeding *en route* at a speed of at least 7 knots (4 knots for ships which are not self-propelled); **(b)** the discharge is made below the waterline; **(c)** the discharge is made not less than 12 nautical miles from the nearest land and in a depth of not less than 25 m.

The discharge into the sea of *Category B* substances (or ballast water, tank washings or other residues containing such substances) shall be prohibited except when all conditions are met: **(a)** the ship is proceeding *en route* at a speed of at least 7 knots (4 knots for ships which are not self-propelled); **(b)** the procedures and arrangements for discharge are approved by the government of the Contracting Party under whose authority the ship is operating, and are based on IMO's standards, and the concentration of the substance in the wake astern does not exceed 1/1,000,000; **(c)** the maximum quantity of cargo discharged from each tank shall not exceed the greater of 1 m³ or 1/3,000 of the tank capacity; **(d)** the discharge is made below waterline; **(e)** the discharge is made not less than 12 nautical miles from the nearest land and in a depth of not less than 25 m.

The discharge into the sea of *Category C* substances (or ballast water, tank washings or other residues containing such substances) shall be prohibited except when all conditions are met: **(a)** the ship is proceeding *en route* at a speed of at least 7 knots (4 knots for ships which are not self-propelled); **(b)** the procedures and arrangements for discharge are approved by the government of the Contracting Party under whose authority the ship is operating, and are based on IMO's standards, and the concentration of the substance in the wake astern does not exceed 10/1,000,000; **(c)** the maximum quantity of cargo discharged from each tank shall not exceed the greater of 3m³ or 1/1,000 of the tank capacity; **(d)** the discharge is made below the waterline; **(e)** the discharge is made not less than 12 nautical miles from the nearest land and in a depth of not less than 25 m.

Category D in all areas – the discharge into the sea of *Category D* substances (or ballast water, tank washings or other residues containing such substances) shall be prohibited except when all conditions are met: **(a)** the ship is proceeding *en route* at a speed of at least 7 knots (4 knots for ships which are not self-propelled); **(b)** the concentration substance/water does not exceed 1/10; **(c)** the discharge is made not less than 12 nautical miles from the nearest land.

Category A, B and C within special areas⁹ – with regard to *Category A* substances, the same requirements apply as for the discharge of *Category A* substances outside special areas, except that: upon washing tanks, which contain such substances, the resulting residue shall be discharged to a reception facility until the concentration of the substance is at or below 0.05% by weight (for yellow or white phosphorus the residual concentration shall be 0.005%).

With regard to *Category B* substances, the same requirements apply as for the discharge of *Category B* substances outside special areas, except that: requirement **(c)** is substituted with the requirement that the tank shall be prewashed, and the resulting tank washings shall be discharged to a reception facility.

With regard to *Category C* substances, the same requirements apply as for the discharge of *Category C* substances outside special areas, except that: the concentration in requirement **(b)** shall not exceed 1/1,000,000, and the maximum quantity of cargo discharged in requirement **(c)** shall not exceed the greater of 1m³ or 1/3,000 of the tank capacity.

Exceptions to these rules – *Regulation 5* of this Annex shall not apply to: **(a)** the discharge into the sea of NLS necessary for securing the safety of a ship or saving life at sea;

⁹ In the *Antarctic area*, any discharge of NLS shall be prohibited.

or (b) the discharge into the sea of NLS resulting from damage to a ship (provided that all reasonable precautions have been taken after the damage occurred for preventing or minimizing the discharge, and except if the owner or master acted intentionally to cause damage or recklessly, being aware that damage would probably result); or (c) the discharge into the sea of NLS is used for combating specific pollution incidents in order to minimize the damage from pollution (Reg.6).

Pumping, piping and unloading arrangements – every ship constructed on or after 1.July.1986 shall be provided with pumping and piping arrangements to ensure that each tank designated for the carriage of a *Category B* or *C* substance does not retain a quantity of residue in excess of 0.1 m³ for *Category B* substances (0.3 m³ for *Category C* substances) in the tank's associated piping and in the immediate vicinity of that tank's suction point. For ships constructed before 1.July.1986, these values are 0.3m³ and 0.9m³, respectively (Reg.5A).

Measures of control (Reg.8) – the government of each contracting party shall appoint or authorize surveyors, who shall execute control in accordance with the provisions hereunder. With regard to *Category A* substances, the following shall apply in all areas – a tank which has been unloaded shall be washed before the ship leaves the port of unloading. The effluent from the tank washing shall be discharged to a reception facility at least until the concentration of the substance in the discharge has fallen to: outside special areas, at or below 0.1% by weight (for yellow or white phosphorus the residual concentration shall be 0.01%); within special areas, at or below 0.05% by weight (for yellow or white phosphorus, 0.005%).

With regard to *Category B* and *C* substances outside special areas, the following shall apply – a tank which has been unloaded shall be prewashed before the ship leaves the port of unloading whenever: (1) the substance unloaded results in a residue quantity exceeding the maximum quantity which may be discharged into the sea outside special areas according to Reg. 5 – the greater of 1 m³ or 1/3,000 of the tank capacity for *Category B* substances, and the greater of 3m³ or 1/1,000 of the tank capacity for *Category C* substances; or (2) the unloading is not carried out in accordance with the pumping conditions approved by the government under whose authority the ship is operating, and based on IMO's standards. The resulting tank washings shall be discharged to a reception facility at the port of unloading.

With regard to *Category B* substances within special areas, the following shall apply – a tank which has been unloaded shall be prewashed before the ship leaves the port of unloading, and the resulting tank washings shall be discharged to a reception facility at the port of unloading.

With regard to *Category C* substances within special areas, the following shall apply – a tank which has been unloaded shall be prewashed before the ship leaves the port of unloading, and the resulting tank washings shall be discharged to a reception facility at the port of unloading, whenever: (1) the substance unloaded results in a residue quantity exceeding the maximum quantity which may be discharged into the sea within special areas in accordance with Reg.5(9) – the greater of 1m³ or 1/3,000 of the tank capacity; or (2) the unloading is not carried out in accordance with the pumping conditions approved by the government under whose authority the ship is operating, and based on IMO's standards.

The requirement to prewash with regard to the carriage of *Category B* and *C* substances within special areas does not apply when all of the following conditions are met: (1) the substance unloaded results in a residue quantity not exceeding the maximum quantity which may be discharged into the sea outside special areas in accordance with *Reg.5(2)* and *Reg.5(3)*, respectively – the greater of 1 m³ or 1/3,000 of the tank capacity for *Category B* substances, and the greater of 3m³ or 1/1,000 of the tank capacity for *Category C* substances – and the residues are retained on board for subsequent discharge in accordance with *Reg.5(2)* or *Reg.5(3)*, respectively; and (2) the unloading is carried out in accordance with the pumping conditions approved by the government under whose authority the ship is operating, and based on IMO's standards.

At the request of the ship's master, the government of the receiving Party may exempt the ship from the abovementioned requirements to wash or prewash regarding the carriage of *Category A, B, or C* substances outside or within special areas, where: (1) the tank unloaded is to be reloaded with the same or compatible substance and the tank will not be washed or ballasted prior to loading; or (2) the tank unloaded is neither washed nor ballasted at sea, and the respective requirements are complied with at another port; or (3) the cargo residues will be removed by a ventilation procedure.

With regard to *Category D* substances in all areas, a tank which has been unloaded shall be: (1) washed and the resulting washings shall be discharged to a reception facility; or (2) the remaining residues in the tank shall be diluted and discharged into the sea in accordance with *Reg.5(4)*.

Cargo Record Book – every ship to which *Annex II* applies shall be provided with a Cargo Record Book, which shall be completed whenever there is: loading of cargo; internal transfer of cargo; unloading of cargo; cleaning of cargo tanks; ballasting of cargo tanks; discharge of ballast from cargo tanks; disposal of residues to reception facilities; discharge into the sea or removal by ventilation of residues in accordance with *Reg.5* of *Annex II* (*Reg.9*).

Surveys – ships carrying NLS shall be subject to the following surveys carried out by officers of the government or surveyors: (a) an initial survey before the ship is put in service or before the NLS Certificate (International Pollution Prevention Certificate for the Carriage of NLS in Bulk) is issued for the first time; (b) a renewal survey at intervals not exceeding 5 years; (c) an intermediate survey within three months before or after the date of the first and second expiry of the Certificate, which shall take the place of one of the annual surveys; (d) an annual survey within three months before or after each expiry of the NLS Certificate; (e) an additional survey either general or partial after a repair (*Reg.10*).

Annex III of MARPOL 73/78 – Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form

Application – *Annex III* shall apply to all ships carrying harmful substances in packaged form. This Annex does not apply to ship's stores and equipment. Harmful substances are those listed as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code) (*Reg.1*). Harmful substances are also substances that are identified

as being: (1) bioaccumulated to a significant extent and known to produce a hazard to aquatic life or to human health; or (2) bioaccumulated with attendant risk to aquatic organisms or to human health with a short retention of the order of one week or less; or (3) liable to produce tainting of seafood; or (4) highly toxic to aquatic life (*Appendix*). The carriage of harmful substances is prohibited, except in accordance with this Annex.

Packaging – “Packaged form” is the forms of containment specified for harmful substances in the IMDG Code (*Reg.1(1.3)*). Packages shall be adequate to minimize the hazard to the marine environment (*Reg.2*). Empty packagings which have been used previously for the carriage of harmful substances shall themselves be treated as harmful substances unless adequate precautions have been taken to ensure that they contain no residue that is harmful to the marine environment (*Reg.1(4)*).

Marking and labelling – Packages containing a harmful substance shall be durably marked with: (1) the correct technical name (other than the trade name); and (2) a durable mark or label indicating that the substance is a marine pollutant. Where possible, other means of identification should be provided (*e.g.* the relevant UN number). All this identification information should be still identifiable on packages surviving at least three months’ immersion in the sea. Packages containing small quantities of harmful substances may be exempted from these marking requirements; the specific exemptions are provided in the IMDG Code (*Reg.3*).

Documentation – In all documents relating to the carriage of harmful substances by sea, where these substances are named, the correct technical name shall be used (as opposed to trade names alone), and the substance shall be additionally identified via the words “MARINE POLLUTANT”. The shipper shall supply, together with the shipping documents, a signed certificate or declaration that the shipment is properly packaged and marked, labelled or placarded and in the proper condition for carriage. Furthermore, each ship carrying harmful substances shall have a special list or manifest setting forth the harmful substances carried and their location on board. The latter documents may be substituted with a detailed stowage plan if it sets out the location of the harmful substances on board. In case the ship carries a special list or manifest or a detailed stowage plan, required for the carriage of dangerous goods in accordance with the International Convention for the Safety of Life at Sea (SOLAS), the documents required by *MARPOL 73/78 Annex III* and the documents required by *SOLAS* may be combined, but a clear distinction shall be made between dangerous goods and harmful substances (*Reg.4*).

Stowage – Harmful substances shall be properly stowed and secured so as to minimize the hazards to the marine environment without impairing the safety of the ship and persons on board (*Reg.5*).

Exceptions – Jettisoning of harmful substances carried in packaged form shall be prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea. Appropriate measures shall be taken to regulate the washing of leakages overboard, provided that such measures would not impair the safety of the ship and persons on board (*Reg.7*).

Annex IV of MARPOL 73/78 – Regulations for the Prevention of Pollution by Sewage from Ships

Application – The provisions of *Annex IV* shall apply to: (1) ships of 200t GT and above; (2) ships of less than 200t GT which are certified to carry more than 10 persons; (3) ships which do not have a measured gross tonnage and are certified to carry more than 10 persons (*Reg.2*). For the purpose of this Annex, “special areas” means a sea area where it is required the adoption of special mandatory methods for the prevention of sea pollution by sewage, and includes: (1) the *Baltic Sea* area; and (2) any other sea area designated by IMO with respect to prevention of pollution by sewage from ships (*Reg.1*).

Surveys – Every ship which is required to comply with this Annex shall be subject to the following surveys:

(a) an initial survey before the ship is put into service or before the International Sewage Pollution Prevention Certificate (1973) is issued for the first time, and such a survey shall ensure:

(1) that, when the ship is fitted with a sewage treatment plant, the plant shall meet operational requirements based on IMO’s standards and test methods;

(2) that, when the ship is fitted with a system to comminute and disinfect the sewage, such a system shall be of a type approved by the government under whose flag the ship is operating;

(3) that, when the ship is equipped with a holding tank for the collection and storage of sewage, the capacity of such tank shall be to the satisfaction of the government under whose flag the ship is operating, and for the retention of all sewage having regard to the operation of the ship, number of persons on board and other relevant factors;

(4) that the ship is equipped with a pipeline leading to the exterior convenient for the discharge of sewage to a reception facility;

(b) periodical surveys at intervals not exceeding five years which shall ensure that the equipment, fittings, arrangements and material fully comply with the applicable requirements of this Annex (*Reg.3*).

Issue of a Certificate – An International Sewage Pollution Prevention Certificate (1973) will be issued either by the government under whose authority the ship is operating or by any persons or organizations duly authorized by it (*Reg.4*). The Certificate shall be valid for a period specified by the government that issued it but it shall not exceed five years. In case the Certificate expires at a time when the ship is not in a port or offshore terminal under the jurisdiction of the flag state, the Certificate may be extended but only for the purpose of allowing the ship to complete its voyage to the flag state and only in cases where it appears proper and reasonable to do so. No Certificate shall be thus extended for a period longer than five months (*Reg.7*).

Discharge of sewage – The discharge of sewage into the sea is prohibited, except when:

(a) the ship is discharging comminuted and disinfected sewage, using a system to comminute and disinfect the sewage, at a distance of more than 4 nautical miles from the nearest land (if sewage is not comminuted or disinfected, at a distance of more than 12

nautical miles from the nearest land), provided that in any case the sewage that has been stored in holding tanks shall not be discharged instantaneously but at a moderate rate when the ship is *en route* and proceeding at not less than 4 knots; or

(b) the ship has in operation an approved sewage treatment plant, and the effluent shall not produce visible floating solids in, nor cause discoloration of, the surrounding water; or

(c) the ship is in the waters under the jurisdiction of a state and is discharging sewage in accordance with such less stringent requirements as may be imposed by such state.

When the sewage is mixed with wastes or waste water having different discharge requirements, the more stringent requirements will apply (*Reg.8*).

Exceptionally, the requirements on discharge of sewage in shall not apply when: (a) the discharge of sewage from a ship is necessary to secure the safety of a ship and those on board or save life at sea; or (b) the discharge of sewage results from damage to a ship or its equipment provided that all reasonable precautions have been taken before and after the occurrence of the damage for the purpose of preventing or minimizing the discharge (*Reg.9*).

Annex V of MARPOL 73/78 – Regulations for the Prevention of Pollution by Garbage from Ships

Application – The provisions of *Annex V* shall apply to all ships (*Reg.2*). For the purpose of this Annex, “garbage” means all kinds of victual, domestic and operational waste (excl. fresh fish and parts thereof), generated during the normal operation of the ship (*Reg.1*). For the purpose of this Annex, “special areas” means a sea area where it is required the adoption of special mandatory methods for the prevention of sea pollution by garbage, and includes: (1) the *Mediterranean Sea* area; (2) the *Baltic Sea* area; (3) the *Black Sea* area; (4) the *Red Sea* area; (5) the *Gulfs area*; (6) the *North Sea* area; (7) the *Antarctic* area; (8) the *Wider Caribbean Region* (including the Gulf of Mexico and the Caribbean Sea) (*Reg.5*).

Disposal of garbage from fixed or floating platforms – The disposal of garbage is prohibited from fixed or floating platforms and from all other ships when alongside or within 500 m of such platforms. However, the disposal into the sea of food wastes may be permitted when they have passed through a comminuter or grinder from such fixed or floating platforms located more than 12 nautical miles from land and all other ships when alongside or within 500 m of such platforms (*Reg.5*). For the purpose of this Annex, any comminuted or ground garbage or food wastes shall be capable of passing through a screen with openings no greater than 25 mm.

Disposal of garbage – The Annex has laid down a general prohibition. Accordingly, the discharge of all garbage into the sea is prohibited, except as provided otherwise in the regulations of the Annex (*Reg.3*). Discharge into the sea of all plastics (*e.g.* synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products) is prohibited. The discharge into the sea of cooking oil is also prohibited.

Outside special areas – discharge of the following garbage into the sea outside special areas shall only be permitted while the ship is *en route*¹⁰ and as far as practicable from the

¹⁰ The *en route* requirement shall not apply to the discharge of food wastes where retention on board presents an imminent health risk to the people on board.

nearest land, but in any case not less than: **(a)** 3 nautical miles from the nearest land for food wastes which have been passed through a comminuter or grinder (12 nautical miles for food wastes which haven't been treated accordingly); **(b)** 12 nautical miles from the nearest land for cargo residues that cannot be recovered using commonly available methods for unloading (cargo residues shall not contain any substances classified as harmful to the marine environment); **(c)** for animal carcasses, discharge shall occur as far from the nearest land as possible. When garbage is mixed with or contaminated by other substances prohibited from discharge or having different discharge requirements, the more stringent requirements shall apply (*Reg.4*).

Within special areas – discharge of the following garbage into the sea within special areas shall only be permitted while the ship is *en route*¹¹ and as follows: **(a)** as far as practicable from the nearest land, but not less than 12 nautical miles from the nearest land or the nearest ice shelf for food wastes which have been passed through a comminuter or grinder; food wastes shall not be contaminated by any other garbage type. Discharge of introduced avian products, including poultry and poultry parts, is not permitted in the *Antarctic area* unless it has been treated to be made sterile. **(b)** for cargo residues that cannot be recovered using commonly available methods for unloading, when all of the following conditions are met: (1) cargo residues, cleaning agents or additives, contained in hold washing water do not include any substances classified as harmful to the marine environment; (2) both the port of departure and the next port of destination are within the special area and the ship will not transit outside the special area between those ports; (3) no adequate reception facilities are available at those ports; (4) the discharge of cargo hold washing water containing residues shall be made as far as practicable from the nearest land or the nearest ice shelf and not less than 12 nautical miles from the nearest land or the nearest ice shelf (*Reg.6*).

Exceptions – the rules in *Reg. 3, 4 and 5* shall not apply to: **(a)** the disposal of garbage from a ship for securing the safety of the ship and those on board, or for saving life at sea; or **(b)** the accidental loss of garbage resulting from damage to the ship or its equipment, provided that all reasonable precautions have been taken before and after the occurrence of the damage for the purpose of preventing or minimizing the accidental loss; or **(c)** the accidental loss of a fishing gear from a ship, provided that all reasonable precautions have been taken to prevent such loss; **(d)** the discharge of fishing gear from a ship for the protection or for the safety of that ship or its crew (*Reg.7*).

Garbage Record Book – every ship of 400t GT and above and every ship which is certified to carry 15 persons or more shall be provided with a Garbage Record Book whether as a part of the ship's official log-book or otherwise. Each discharge operation, or completed incineration, shall be recorded in the Garbage Record Book and signed by the officer in charge. Additionally, every ship of 400t GT and above and every ship which is certified to carry 15 persons or more shall carry a garbage management plan with written procedures which the crew shall follow. Every ship of 12m or more in length overall shall display placards which notify the crew and passengers of the disposal requirements set forth in *Reg.3 and 5 (Reg.10)*.

¹¹ The *en route* requirement shall not apply to the discharge of food wastes where retention on board presents an imminent health risk to the people on board.

Annex VI of MARPOL 73/78 – Regulations for the Prevention of Air Pollution from Ships

Application – The provisions of *Annex VI* shall apply to all ships, except where expressly provided otherwise (*Reg.1*). The regulations of this Annex shall not apply to: (a) any emission necessary for the purpose of securing the safety of a ship or saving life at sea; or (b) any emission resulting from damage to a ship or its equipment, provided that all reasonable precautions have been taken after the occurrence of the damage for the purpose of preventing or minimizing the emission and provided that the owner or the master did not act with intent to cause damage or recklessly or with knowledge that damage would probably result (*Reg.3*).

Surveys – (*Reg.5*) Every ship of 400t GT and above and every fixed and floating drilling rig and other platforms shall be subject to the following surveys carried out by officers of the government under whose authority the ship is operating or by surveyors or organizations recognized by that government: (a) an initial survey before the ship is put into service or before the International Air Pollution Prevention Certificate is issued for the first time; (b) a renewal survey at intervals not exceeding five years; (c) an intermediate survey within three months before or after the date of first and second expiry of the Certificate, which shall take the place of one of the annual surveys; (d) an annual survey within three months before or after each expiry of the Certificate; (e) an additional survey either general or partial after a repair.

International Air Pollution Prevention Certificate – An International Air Pollution Prevention Certificate shall be issued to: (a) any ship of 400t GT or above engaged in voyages to ports of offshore terminals under the jurisdiction of another Party; and (b) platforms and drilling rigs engaged in voyages to waters under the sovereignty of another Party (*Reg.6*). The Certificate shall be issued for a period not exceeding five years, and this five-year period of validity may be extended with no more than five months only if the ship, at the time when the Certificate expires, is not in a port of the flag state. Such extension shall be granted by the government under whose authority the ship is operating only for the purpose of allowing the ship to complete its voyage to the flag state and only when it appears proper and reasonable to do so (*Reg.9*).

Ozone-depleting substances – Any deliberate emissions of ozone-depleting substances shall be prohibited. Deliberate emissions include emissions that occur in the course of maintaining, servicing, repairing or disposing of systems or equipment, and it does not include minimal releases associated with the recapture or recycling of an ozone-depleting substance. New installations which contain ozone-depleting substances shall be prohibited on all ships, except that new installations containing hydrochlorofluorocarbons (HCFCs) are permitted until 1 January 2020 (*Reg.12*).

Nitrogen oxides (NO_x) – This regulation shall apply to: (a) each diesel engine with a power output of more than 130 kW which is installed on a ship constructed on or after 1 January 2000; and (b) each diesel engine with a power output of more than 130 kW which undergoes a major conversion (e.g. the engine is replaced by a new engine; any substantial modification; the maximum continuous rating of the engine is increased by more than 10%)

on or after 1 January 2000. This regulation does not apply to: (a) emergency diesel engines, engines installed in lifeboats and any device or equipment to be used solely for emergency; (b) engines installed on ships solely engaged in voyages within waters subject to the sovereignty and jurisdiction of the flag state. The operation of each diesel engine to which this regulation applies is prohibited, except when the emissions of nitrogen oxides from the engine is within the following limits: (1) 17.0 g/kWh when n is less than 130 rpm (n = rated engine speed; crankshaft revolutions per minute); (2) $45.0 \times n^{(-0.2)}$ g/kWh when n is 130 or more but less than 2000 rpm; (3) 9.8 g/kWh when n is 2000 rpm or more. Notwithstanding these provisions, the operation of a diesel engine is permitted when: (1) an exhaust gas cleaning system, approved by the government, is applied to the engine to reduce onboard NO_x emissions at least to the limits specified above; or (2) any other equivalent method, approved by the government, is applied to reduce onboard NO_x emissions at least to the limits specified above (Reg.13).

Sulphur oxides (SO_x) – The Sulphur content of any fuel oil used on board ships shall not exceed 4.5% m/m. While ships are within SO_x emission control areas (the *Baltic Sea* area, the *North Sea* area, the *North American* area, the *United States Caribbean Sea*), at least one of the following conditions shall be fulfilled: (a) the sulphur content of fuel oil used on board ships in a SO_x emission control area does not exceed 1.5% m/m; or (b) an exhaust gas cleaning system is applied to reduce the total emission of sulphur oxides from ships, including auxiliary and main propulsion engines, to 6.0 g SO_x/KWh or less; or (c) any other technological method is applied that is verifiable and enforceable to limit SO_x emissions to a level equivalent to that described in (b) (Reg.14).

Shipboard incineration – Shipboard incineration shall be allowed only in a shipboard incinerator (Reg.16). However, shipboard incineration of sewage sludge and sludge oil generated during the normal operation of a ship may also take place in the main or auxiliary power plant or boilers but shall not take place inside ports, harbours, and estuaries. Shipboard incineration of the following substances shall be prohibited: (a) *Annex I, II and III* cargo residues; (b) polychlorinated biphenyls (PCBs); (c) garbage as defined in *Annex V*; (d) refined petroleum products containing halogen compounds; (e) polyvinyl chlorides (PVCs), except in shipboard incinerators for which IMPO Type Approval Certificates have been issued.

Fuel oil quality – Fuel oil for combustion purposes on board ships shall meet the following requirements:

- the fuel oil shall be blends of hydrocarbons derived from petroleum refining; the fuel oil shall be free from inorganic acid; the fuel oil shall not include any added substance or chemical waste which either: (i) jeopardizes the safety of ships or adversely affects the performance or the machinery, or (ii) is harmful to personnel, or (iii) contributes overall to additional air pollution;

- fuel oil for combustion purposes derived by methods other than petroleum refining shall not: exceed the sulphur content set forth in *Reg.14*; cause an engine to exceed the NO_x limits set forth in *Reg.13*; contain inorganic acid; and results in (i), (ii) or (iii).

This regulation does not apply to coal in its solid form or nuclear fuels (Reg.18).

4. Conclusion

As evident, MARPOL is an all-embracing legislation aimed against environmental pollution from ships, and it is the first and only one of its kind. Its integrated structure covers all types of pollution that can occur as a result of both accidental and operational causes. Shipowners are advised to be familiar with MARPOL's technical requirements and specifications because port authorities throughout the world (most notably those in the USA, Germany, and France) are taking an increasingly stringent policy towards ships that are suspected of infringing the regulations of MARPOL, which can result in substantial fines.